REMARKS

The Official Action dated November 12, 2009 has been carefully considered. Accordingly, the present Amendment is believed sufficient to place the present application in condition for allowance. Reconsideration is respectfully requested.

By the present Amendment, claims 1 and 12 are amended to clarify that the layer structure is not oriented, i.e., is not stretched or expanded, in accordance with the teachings in the specification, for example at page 12, line 3-page 13, line 27, page 21, lines 3-5, and the Examples, including, but not limited to, Example 1 at page 30, line 15-page 32, line 1. It is believed that these changes do not involve any introduction of new matter, whereby entry is believed to be in order and is respectfully requested.

As a result of Applicants' previous Amendments, claims 1, 5, 7-15 and 17-22 are pending. As claims 21 and 22 are not rejected in the Official Action, an indication of allowance thereof is respectfully requested.

At pages 8-9 of the Official Action, the Examiner first indicated that the Examiner disagrees with the argument in the Amendment filed October 19, 2009, that Tanaka et al, WO 03/091317 (Tanaka '317), is not proper prior art with respect to the present application. However, at page 9, the Examiner indicated that the argument is persuasive. In a telephone conversation with the undersigned, the Examiner clarified that Tanaka '317 is not proper prior art and therefore the rejection under 35 USC §103 based on Tanaka '317 has been withdrawn.

In the Official Action, claims 1-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Ohba PCT WO 99/52973, the Examiner relying on the equivalent U.S. Patent No. 6,605,344 (U.S. '344) as an English translation of WO 99/52973, in view of the Bekele U.S. Patent No. 5,482,770. The Examiner asserted it would have been obvious to orient the film of Ohba in view of the teachings of Bekele. In response to Applicants'

previous arguments, the Examiner maintained that a prima facie case of obviousness exists where the claimed ranges and the prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. The Examiner asserted that there is no teaching in Ohba or elsewhere in the prior art that suggests that the film would be inoperable with less than 1% polyalcohol and, to the contrary, the skilled artisan would expect the film to have virtually the same properties. The Examiner further asserted that polycarboxylic acid is known to have excellent barrier properties but it is humidity sensitive and the polyalcohol improves the resistance to humidity, but the adjacent metal layer also provides crosslinking and a polymeric overlay provides efficient barrier properties to humidity. Finally, the Examiner asserted that arguments cannot take the place of evidence in asserting that Ohba's heat treatment would prevent the film from shrinking under the claimed conditions, and the Examiner further asserted that the heat treatment of Ohba would not be necessary if the composition did not contain polyalcohol.

However, Applicants submit that heat-shrinkable multi-layer films according to claims 1, 4, 5, 7-15 and 17-20 are nonobvious over and patentably distinguishable from the combination of Ohba and Bekele. Accordingly, this rejection is traversed and reconsideration is respectfully requested.

More particularly, the present invention is directed to a multi-layer film which is both heat shrinkable and exhibits excellent oxygen barrier properties after heat shrinkage. As defined by claim 1, the multi-layer film comprises a heat-shrinkable base film and, provided on at least one surface of the base film, at least one layer structure including a layer (a) formed of a poly(carboxylic acid) polymer (A) and free of polyalcohol, and a layer (b) formed of a polyvalent metal compound (B), the layers (a) and (b) being in contact with each other. The layer structure is not oriented, yet the multi-layer film and the base film each exhibit a percent thermal shrinkage in at least one direction of 5 to 90% as measured by

immersing the respective film in hot water at 90°C for 30 seconds and the multilayer film exhibits an oxygen permeability of 100 $cm^3/(m^2 \cdot day \cdot MPa)$ or less as measured at 30°C and a relative humidity of 80% after thermal shrinkage treatment. Claim 12 recites a similar multi-layer film wherein the layer containing the polyvalent metal compound (B) is formed of a resin.

It is surprising and nonobvious that a multilayer film including a gas barrier non-oriented layer structure of a polymer layer (a), free of polyalcohol, and a layer containing a polyvalent metal as claimed, formed on a heat shrinkable base film, exhibits heat shrinkability without impairing the gas barrier properties. In this regard, the Examiner's attention is directed to Table 1 at page 37 of the present application which shows the low oxygen permeability exhibited by the claimed multi-layer films, both before and after thermal shrinkage treatment.

The multi-layer films of the present invention are distinguishable from the combination of Ohba and Bekele in several important respects. First, as noted above, the Examiner has asserted that it would have been obvious to orient the film of Ohba in view of the teachings of Bekele. However, Bekele discloses a highly oriented multilayer film comprising a barrier layer and an orientation-compatible polymeric layer. The highly oriented multilayer film is formed by orientation of the layers at an orientation ratio of from about 9 to 20 and a temperature of from about 165°F to about 212°F and during the orientation, the coated substrate is preferably expanded in both the machine direction (i.e., stretch) and the transverse direction (i.e., blown), followed by cooling and winding the expanded coated substrate (see column 3, lines 10-16 and column 11, lines 46-60).

In contrast, the multi-layer film of claims 1 and 12 comprises a heat-shrinkable base film and a non-oriented layer structure provided on one surface of the base film. Importantly, the layer structure is not oriented, rather, it is, for example, merely coated on the base layer,

yet the multi-layer film and the base film each exhibit a percent thermal shrinkage in at least one direction of 5 to 90% according to the measurement technique recited in the claims 1 and 12, while maintaining gas barrier properties. Bekele provides no teaching or suggestion of a multilayer film wherein a layer structure is not oriented, yet the multilayer film exhibits thermal shrinkage in at least one direction of 5 to 90% according to the measurement technique recited in the claims 1 and 12 while maintaining gas barrier properties. To the contrary, Bekele teaches away from the presently claimed multilayer films in teaching a multilayer film which is highly oriented by use of an orientation ratio of from 9 to 20 and high temperature treatment. It is error to find obviousness where references diverge from and teach away from the invention at hand, *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988). Additionally, if one of ordinary skill in the art were to combine the teachings of Ohba with Bekele as asserted by the Examiner, the multilayer film of claims 1 and 12 would not result, as the multilayer film would not contain a non-oriented layer structure.

Moreover, there are additional significant differences between the multilayer films of claims 1 and 12 and the teachings of Ohba and Bekele. The layer (a) in claim 1 of the present application is "free of polyalcohol", while, in contrast, the polymer layer disclosed in Ohba is "produced from a mixture of polyalcohol and at least one poly(meth)acrylic acid polymer" (Abstract). The Examiner has asserted that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, i.e., a coating with 0% polyalcohol would have been expected to have the same properties as a coating having 1% polyalcohol, and there is no teaching in Ohba or elsewhere in the prior art that suggests that the film would be inoperable with less than 1% polyalcohol and, to the contrary, the skilled artisan would expect the film to have virtually the same properties.

Applicants respectfully submit however that the Examiner's assertions are contrary to the explicit teachings of Ohba and the knowledge in the art and have no basis in the evidence of record or in precedential case law. That is, Ohba repeatedly discloses that polyalcohol is a required component for producing the processed-polymer layer. See U.S. '344, for example, the Abstract (The present invention provides….a processed-polymer layer produced from a mixture of a polyalcohol and at least one poly(meth)acrylic acid polymer…"); column 1, lines 5-11 ("The present invention relates to….a polymer layer formed from a specific polymer, and more particularly….formed from a mixture of a poly(meth)acrylic acid polymer and a polyalcohol"); column 2, lines 1-5 ("…. a polymer layer formed from a mixture of a polyalcohol and at least one poly(meth)acrylic acid polymer…"), and column 3, lines 23-27 ("In the film of the present invention….a polymer layer formed from a mixture of a poly(meth)acrylic acid polymer and a polyalcohol"). Ohba uses polyalcohol in not only all of the Examples, but also Comparative Examples 1 to 21, and 24. While Comparative Examples 22, 23 and 25 do not use polyalcohol, they do not use poly(meth)acrylic acid polymer as well. Applicants cannot find any teaching or suggestion by Ohba of a poly(meth)acrylic acid polymer layer which is free of polyalcohol or that the polyalcohol can be omitted, and, importantly, the Examiner has not indicated any such teaching in Ohba.

The Examiner has relied on Ohba's teaching that in consideration of production of a polymer layer exhibiting excellent oxygen-gas-barrier properties under high humidity, the mixture ratio by rate of poly(meth)acrylic acid polymer to polyalcohol is preferably 99:1-20:80, more preferably 95:5-40:60, much more preferably 95:5-50:50 (column 5, lines 50-55 of U.S. '344). However, nowhere does Ohba suggest that the polyalcohol may be omitted or is not required. Neither does Ohba provide any basis for one of ordinary skill in the art to conclude that sufficient oxygen-gas-barrier properties under high humidity conditions may be provided while omitting the polyalcohol. To the contrary, omitting polyalcohol is contrary to

the explicit teachings of Ohba. As noted above, it is error to find obviousness where references diverge from and teach away from the invention at hand, *In re Fine,* supra. As Ohba requires polyalcohol in the polymer layer, Ohba teaches away from the claimed invention in which the layer (a) is free of polyalcohol.

The Examiner asserted that ranges which do not overlap but are otherwise close can establish a prima facie case of obviousness, yet the Examiner failed to cite any authority which would allow one to completely eliminate a required component of the prior art to establish a prima facie case of obviousness. To the contrary, the case law on which the Examiner's assertion is based, *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775 (Fed. Cir. 1985), related to a claim directed to an alloy comprising all of the elements of the prior art alloys.

While a prima facie case of obviousness may exist where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, see MPEP §2144.05, the Examiner has not provided any evidentiary basis for asserting that one skilled in would have expected a coating with 0% polyalcohol to have the same properties as a coating having 1% polyalcohol. Similarly, the Examiner has not provided any evidentiary basis for asserting that the functions attributed to the polyalcohol are not required in the barrier coating. In fact, the Examiner's assertions are contrary to the well-known knowledge in the art. In this regard, the Examiner's attention is directed to the Tanaka et al U.S. Patent No. 6,022,913 (Tanaka '913) cited in the Official Action. Tanaka '913 discloses that heat treatment of a film of poly(meth)acrylic acid and polyalcoholic polymer results in a cross-linked structure which has ester bonds and which exhibits hot water resistance and gas barrier properties (see the Abstract, column 1, lines 14-23, and column 8, lines 12-16). Tanaka '913 discloses that the cross-linked structure results with as little as 1% of the polyalcoholic polymer (column 7, lines 14-18). Thus, Tanaka '913

establishes that one of ordinary skill in the art would appreciate that omitting the polyalcohol in the Ohba polymer layer would not provide a cross-linked structure and would not result in a film exhibiting the hot water resistance and gas barrier properties desired by Ohba. Therefore, contrary to the Examiner's assertion, Tanaka '913 shows that one skilled in the art would not have expected a layer free of polyalcohol to have the same properties as the Ohba layer containing 1% polyalcohol.

The Examiner has also asserted that the metal layer provides crosslinking, whereby the polyalcohol may be omitted. Applicants respectfully disagree that the metal layer provides crosslinking. In this regard, the Examiner's attention is directed to the Tanaka et al U.S. Patent No. 7,476,712 B2 (Tanaka '712), also cited in the Official Action. Specifically, Tanaka '712 discloses that ionic bonds form between polyvalent metal ions and a poly(carboxylic acid) polymer layer (column 2, lines 53-59). Tanaka '712 studies various aspects of the polyvalent metal ion reaction with a poly(carboxylic acid) polymer layer and particularly the ionization degree determined by the molar amount of the resulting ionic polycarboxylate salt (see column 14, line 45-column 15, line 3). Thus, one of ordinary skill in the art will appreciate that the polyvalent metal layer provides an ionic bond, not a covalent bond which results in a polymer crosslinking reaction. Thus, the metal layer does not provide crosslinking and one of ordinary skill in the art would have had no reason to omit the polyalcohol of Ohba.

Further, according to Ohba, the polymer layer is subjected to a heat treatment, for example by passing the layer through an oven which is heated at a predetermined temperature for a predetermined time, or by bringing the layer into contact with a heat roll, and, after completion of the heat treatment, the resultant polymer layer has water resistance, i.e., the resultant polymer layer is insoluble in water or boiling water, and exhibits excellent gas-barrier properties under high humidity (U.S. '344, column 9, lines 47-56). Ohba specifically

indicates that a polymer layer is preferably subjected to heat treatment under conditions satisfying the relations between heat treatment temperature (T, Kelvin) and heat treatment time (t, minutes) as specified by the following formulas (a) and (b):

(a) $\log t \geq -0.0253 \times T + 11.2$, and (b) $373 \leq T \leq 573$ (100°C to 300°C)

(U.S. '344, column 9, lines 24-34). If the heat treatment is conducted at 100°C, T is 373 K, log t is 1.763 or more, and t is 58.0 minutes or more. Ohba specifically discloses Examples where the heat treatment was conducted at a temperature as high as 160°C for 120 minutes, 160°C for 30 minutes, 180°C for 15 minutes or 230°C for 30 seconds.

These heat treatments are significantly more rigorous than the thermal shrinkage treatment recited in claims 1 and 12 to obtain 5 to 90% thermal shrinkage of the presently claimed multi-layer films, i.e., immersion in hot water at 90°C for 30 seconds. Accordingly, one of ordinary skill in the art will appreciate that to heat shrink the gas-barrier film of Ohba, energy greater than that of the heat treatment in Ohba would be required and it would be impossible to heat-shrink the film using less energy than employed in the described heat treatment. In view of the rigorous heat treatment conditions required by Ohba, it is apparent that the conditions for obtaining thermal shrinkage in present claims 1 and 12, i.e., immersion in hot water at 90°C for 30 seconds, cannot result in a thermal shrinkage of 5 to 90% as required by claims 1 and 12 in the films of Ohba and that the energy employed in to obtain thermal shrinkage of the present multi-layer films is far smaller than the energy of the heat treatment in Ohba. Thus, the gas-barrier film resulting from the heat treatment in Ohba is a film that is not heat-shrinkable by immersion in hot water at 90°C for 30 seconds.

The Examiner asserted that arguments cannot take the place of evidence in asserting that Ohba's heat treatment would prevent the film from shrinking under the claimed conditions. Applicants submit that the evidence of record in the form of Ohba's own teachings demonstrates that a heat treatment as presently recited to result in thermal

shrinkage of 5 to 90% at 90°C for 30 seconds, being significantly less in both time and temperature than that required to form Ohba's film, would not achieve the claimed heat shrinkage of 5 to 90%. The Examiner also asserted that the heat treatment of Ohba would not be necessary if the composition did not contain polyalcohol. However, Ohba provides no teaching or suggestion that sufficient barrier properties may be obtained without a polyalcohol, so one of ordinary skill in the art, absent the present application teachings, would have had no reason to omit the polyalcohol or the heat treatment.

Finally, the heat-shrinkable multi-layer film recited in claim 1 of the present application has an oxygen permeability of 100 $cm^3/(m^2 \cdot day \cdot MPa)$ or less as measured at 30°C and a relative humidity of 80%, after thermal shrinkage treatment. Thus, the claimed films exhibit an excellent oxygen gas barrier property without polyalcohol, without subjecting the film to a heat treatment at a high temperature, and after heat shrinkage. Ohba provides no teaching or suggestion of heat shrinkability and therefore provides no teaching or suggestion that the oxygen permeability of a multi-layer film as presently claimed is surprisingly maintained after a thermal shrinkage treatment. Moreover, as Ohba does not show films after thermal shrinkage treatment, Obha does not show films meeting the oxygen permeability requirements of claims 1 and 12.

Thus, as described above, the heat-shrinkable multi-layer films of claims 1 and 12 exhibit excellent oxygen gas barrier properties, even after thermal shrinkage treatment, without employing a polyalcohol and without conducting a heat treatment as disclosed in Ohba. Ohba provides no teaching or suggestion of a such a multi-layer film, and therefore the combination of Ohba and Bekele is further deficient.

In determining patentability under 35 U.S.C. §103, it is necessary to determine whether there was an apparent reason to combine the known elements of the prior art in the fashion of the claims at issue, *KSR International Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1740-

41 (2007). Here, there is no apparent reason for combining the teachings of Ohba and Bekele in a manner which results in the claimed multi-layer films having heat shrinkability and excellent oxygen barrier properties. Accordingly, the combination of Ohba and Bekele does not render the claimed multi-layer films obvious. The rejection under 35 U.S.C. §103 based on Ohba and Bekele is therefore overcome. Reconsideration is respectfully requested.

Claims 1-20 were also rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 15 and 16 of the Tanaka et al U.S. Patent No. 7,476,712 in view of Bekele. The Examiner asserted that Tanaka et al teach the film may be shrinkable and relied on Bekele as teaching that it is desirable for barrier packaging films to be heat shrinkable. This rejection is traversed. However, to expedite prosecution, submitted herewith is a Terminal Disclaimer disclaiming the terminal portion of any patent issuing on the present application which would extend beyond the expiration date of U.S. patent No. 7,476,712 B2. The filing of a terminal disclaimer simply serves the statutory function of removing the rejection of double patenting, and raises neither presumption nor estoppel on the merits of the rejection, *Quad Environmental Technologies v. Union Sanitary District*, 946 F.2d 870 (Fed. Cir. 1991). Thus, the rejection is overcome.

It is believed that the above represents a complete response to the Official Action, and places the present application in condition for allowance. Reconsideration and an early allowance are requested.

Please charge any fees required in connection with the present communication, or credit any overpayment, to Deposit Account No. 503915.

Respectfully submitted,

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